

CLAIMS (US CLAIMS)

1. A method of liquid-phase oxidation reaction using a tungsten species, wherein that, in carrying out said
5 method of liquid-phase oxidation reaction using a catalyst comprising a tungsten species as an essential component, said tungsten species is caused to be supported on a porous support and, further, a third element other than the component elements of said
10 porous support and the tungsten element is caused to coexist in said catalyst.

2. A method of liquid-phase oxidation reaction using a tungsten species according to Claim 1, wherein said
15 third element comprises at least one element selected from the group consisting of the elements of the groups 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 and 17 of the periodic table.

20 3. A method of liquid-phase oxidation reaction using a tungsten species according to Claim 1 or 2, wherein said catalyst is a catalyst calcined at a temperature of 300 to 700°C.

25 4. A method of liquid-phase oxidation reaction using a tungsten species according to Claim 2, wherein said third element comprises at least one element selected from the group consisting of Mg, Ca, La, Re, Fe, Zn, Al, In, Sn, Pb, Sb, Bi and F.

30 5. A method of liquid-phase oxidation reaction using a tungsten species according to Claim 2, wherein said porous support comprises alumina and/or tin oxide as an essential component(s) and said third element comprises
35 at least one element selected from the group consisting

of La, Zn, Al, Sn and Pb and wherein said method of liquid-phase oxidation reaction is a method of liquid-phase epoxidation reaction.

- 5 6. A method of liquid-phase oxidation reaction using a tungsten species according to Claim 1 or 2, wherein said method of liquid-phase oxidation reaction uses hydrogen peroxide as an oxidizing agent.
- 10 7. A method of liquid-phase oxidation reaction using a tungsten species according to Claim 1 or 2, wherein said method of liquid-phase oxidation reaction is carried out by oxidation reaction of compound having at least one ethylenic double bond.
- 15 8. A method of liquid-phase oxidation reaction using a tungsten species according to Claim 1 or 2, wherein said tungsten species content in the catalyst is not less than 1 part by weight but not more than 40 parts by weight per 100 parts by weight of a porous support.
- 20 9. A method of liquid-phase oxidation reaction using a tungsten species according to Claim 1 or 2, wherein said catalyst comprising a tungsten species as an essential component is used for supporting tungstic acid and salts thereof, and salts of tungsten atom-containing heteropolyoxometallate anions.
- 25 10. A method of liquid-phase oxidation reaction using a tungsten species according to Claim 9, wherein said heteropolyoxometallate anions are Keggin-structured heteropolyoxometallate anions represented by the general formula (1):
- 30 $[XW_nO_m]^{q-}$ (1)
- 35 wherein X represents a silicon atom or phosphorus atom;

(n, m) are (12, 14) when there is no deficiency, (11, 39) when there is one deficient structure site, (10, 36) when there are two deficient structure sites, or (9, 34) when there are three deficient structure sites, and
5 q is a positive integer. The value of q is determined by the valence of the element X.

11. A method of preventing a tungsten species leaching, which is carried out by liquid-phase
10 oxidation reaction using a tungsten species according to Claim 1 or 2.

12. A method of preventing a tungsten species leaching, which is carried out by liquid-phase
15 oxidation reaction using a tungsten species according to Claim 3.

13. A method of preventing a tungsten species leaching, which is carried out by liquid-phase
20 oxidation reaction using a tungsten species according to Claim 4.

14. A method of preventing a tungsten species leaching, which is carried out by liquid-phase
25 oxidation reaction using a tungsten species according to Claim 5.

15. A method of preventing a tungsten species leaching according to Claim 11, wherein said tungsten
30 species leaching is not more than 99 mole percent when a tungsten species leaching from the third element-free catalyst is taken as 100 mole percent.